

MJ N-Channel Super Trench II Power MOSFET

Description

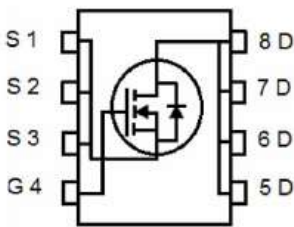
The series of devices uses Super Trench II technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- ◆ $V_{DS}=100V, I_D=75A$
 $R_{DS(ON)}=7.4m\Omega$, typical @ $V_{GS}=10V$
- ◆ Excellent gate charge x $R_{DS(on)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(on)}$
- ◆ 150°C operating temperature
- ◆ Pb-free lead plating

Application

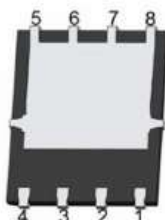
- ◆ DC/DC Converter
- ◆ Ideal for high-frequency switching and synchronous rectification



Schematic Diagram



Top View



Bottom View

DFN 5X6

100% UIS TESTED! 100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
P078N10G	MJXP078N10G	DFN5X6-8L	-	-	-

Absolute Maximum Ratings ($T_c=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	75	A
Drain Current-Continuous($T_c = 100^{\circ}C$)	$I_{D(100^{\circ}C)}$	58	A
Pulsed Drain Current	I_{DM}	300	A
Maximum Power Dissipation	P_D	100	W
Derating factor		0.8	W/ $^{\circ}C$
Single pulse avalanche energy ^(Note 4)	E_{AS}	387	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.25	$^{\circ}C/W$
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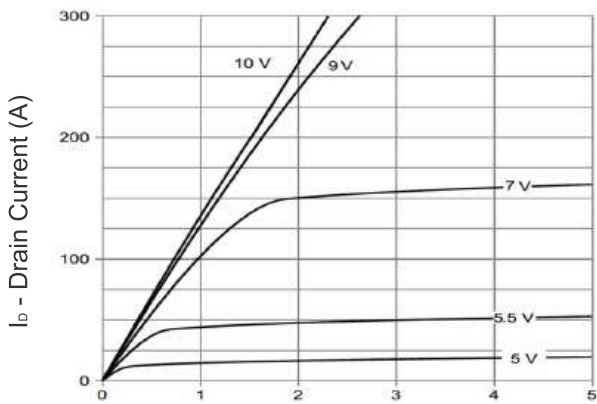
Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{DS} =±20V,V _{GS} =0V	-	-	±100	nA
On Characteristics <small>(Note 3)</small>						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V,I _D =37.5A	-	7.4	8.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =37.5A	-	60	-	S
Dynamic Characteristics <small>(Note 3)</small>						
Input Capacitance	C _{iss}	V _{DS} =50V,V _{GS} =0V F=1.0MHz	-	3070	-	PF
Output Capacitance	C _{oss}		-	290	-	PF
Reverse Transfer Capacitance	C _{rss}		-	23	-	PF
Switching Characteristics <small>(Note 3)</small>						
Turn-on Delay Time	t _{d(on)}	V _{DD} =50V,I _D =37.5A V _{GS} =10V,R _G =1.6Ω	-	15	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	34	-	nS
Turn-Off Fall Time	t _f		-	8	-	nS
Total Gate Charge	Q _g	V _{DS} =50V,I _D =37.5A V _{GS} =10V	-	53	-	nC
Gate-Source Charge	Q _{gs}		-	18	-	nC
Gate-Drain Charge	Q _{gd}		-	16	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <small>(Note 2)</small>	V _{SD}	V _{GS} =0V,I _S =37.5A	-	-	1.2	V
Diode Forward Current	I _S		-	-	75	A
Reverse Recovery Time	t _{rr}	T _J =25°C,I _F =37.5A di/dt= 100A/μs <small>(Note 3)</small>	-	60	-	nS
Reverse Recovery Charge	Q _{rr}		-	106	-	nC

Notes:

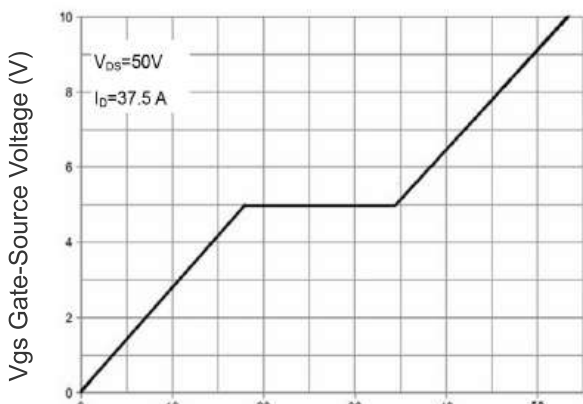
- ① Repetitive Rating: Pulse width limited by maximum junction temperature.
- ② Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- ③ Guaranteed by design, not subject to production
- ④ EAS condition : T_J=25°C,V_{DD}=50V,V_G=10V,L=0.25mH,R_g=25Ω

Typical Electrical and Thermal Characteristics



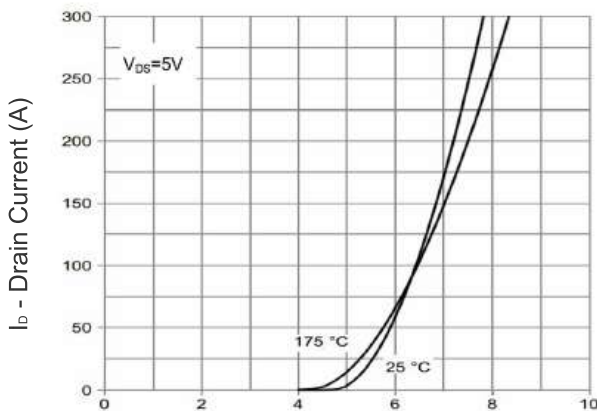
Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



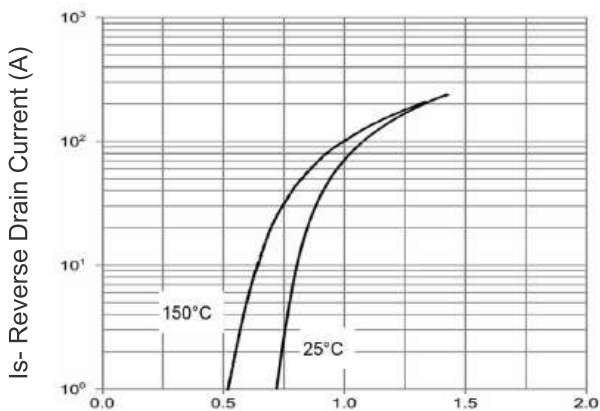
Qg Gate Charge (nC)

Figure 4 Gate Charge



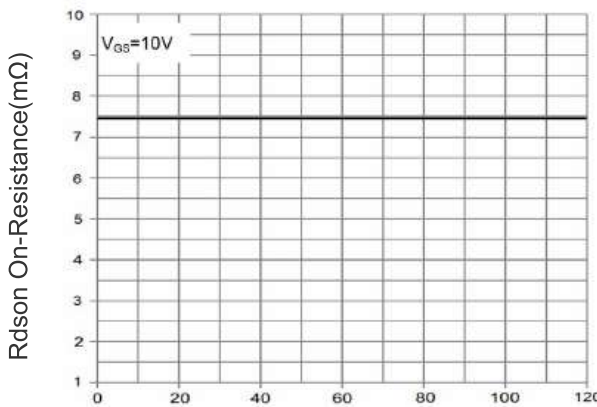
Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



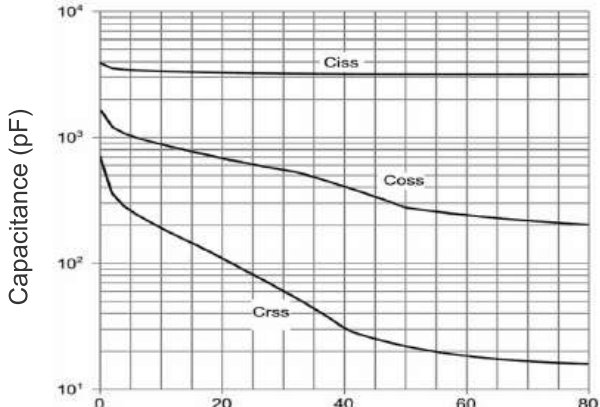
Vsd Source-Drain Voltage (V)

Figure 5 Source- Drain Diode Forward



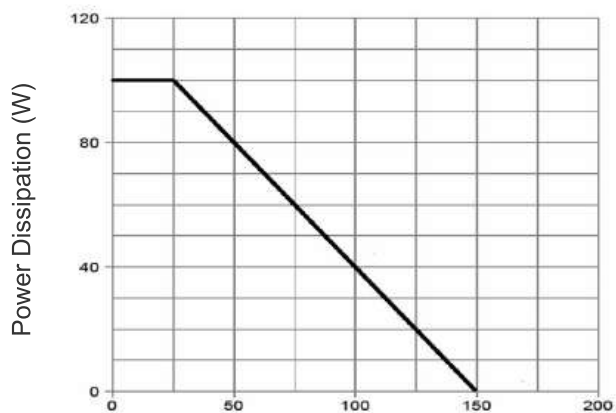
Id - Drain Current (A)

Figure 3 Rdson- Drain Current



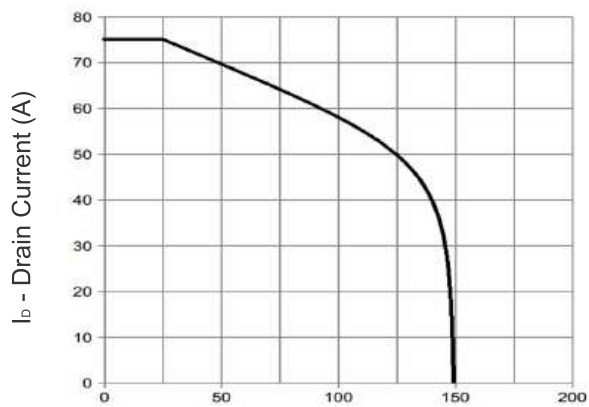
Vds Drain-Source Voltage (V)

Figure 6 Capacitance vs Vds



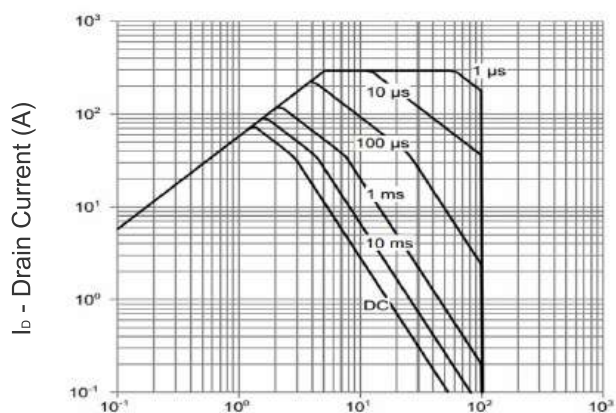
T_J -Junction Temperature($^{\circ}\text{C}$)

Figure 7 Power De-rating



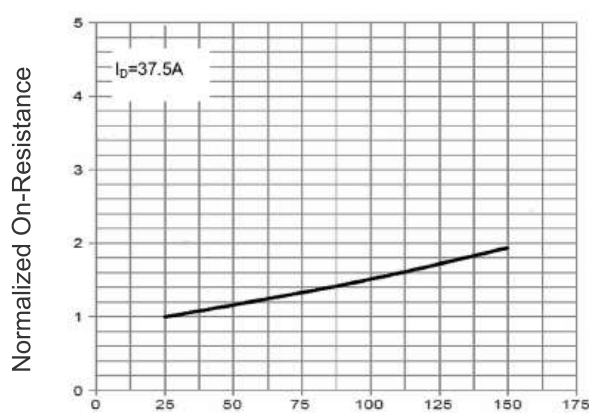
T_J -Junction Temperature($^{\circ}\text{C}$)

Figure 9 Current De-rating



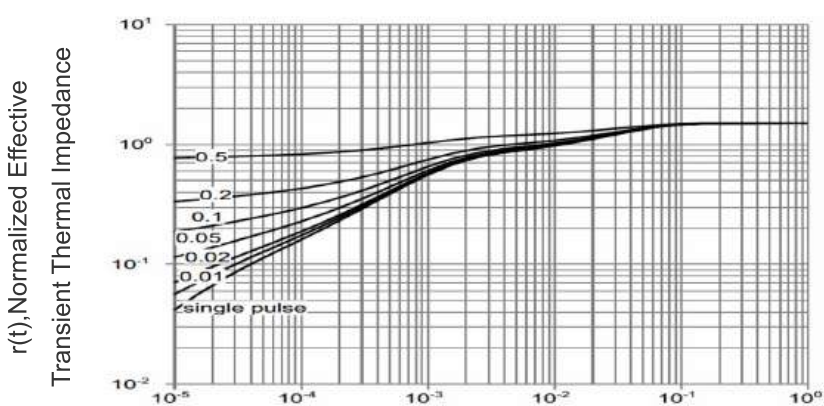
V_{ds} Drain-Source Voltage (V)

Figure 8 Safe Operation Area



T_J -Junction Temperature($^{\circ}\text{C}$)

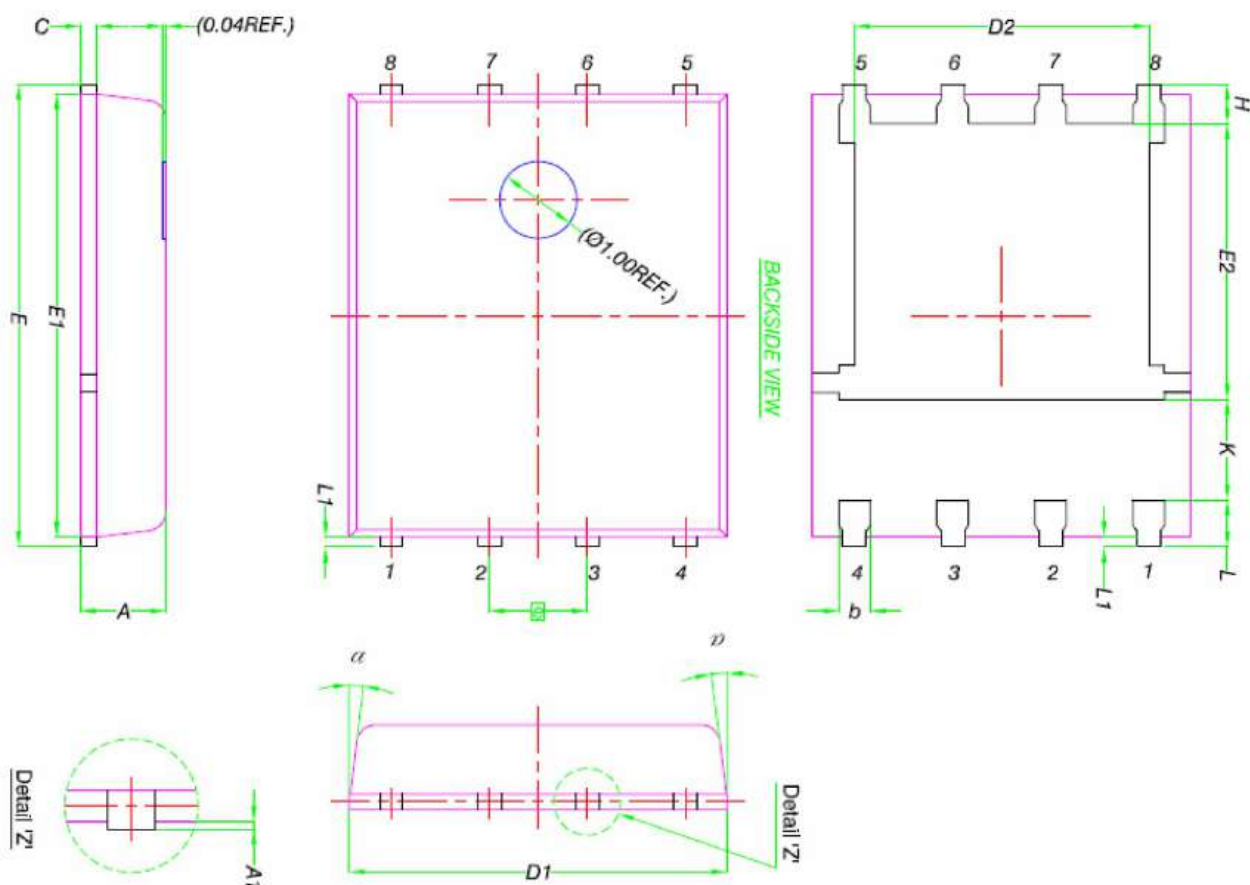
Figure 10 $R_{ds(on)}$ -Junction Temperature



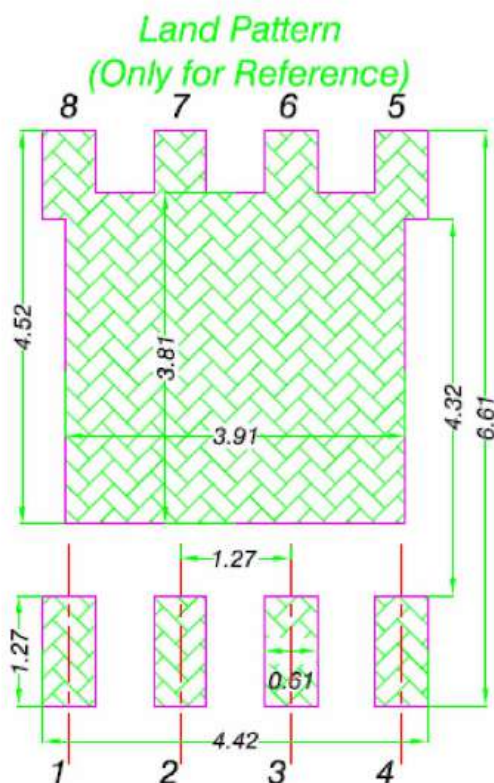
Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°



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